instruction manual

335

TELEDYNE BROWN ENGINEERING
Analytical Instruments

TELEDYNE BROWN ENGINEERING
Analytical Instruments
16830 CHESTNUT STREET
P.O. BOX 1580
CITY OF INDUSTRY, CALIFORNIA 91749-1580 USA
TELEPHONES: (213) 283-7181 & (818) 961-9221
CABLE ADDRESS: TDYANALY
TWX: (910) 584-1887 TDYANYL COID
FAX: (818) 961-2538

Dear Valued Customer:

Thank you for purchasing a Teledyne Brown Engineering Analytical Instruments product.

We've been in business over 40 years, and we've learned the importance of keeping satisfied customers. We want your business now and in the future. That's why everyone at Teledyne is committed to the highest standards of performance and customers satisfaction.

If there's anything we can do to improve your satisfaction with our products, we want to know about it. We welcome and encourage your candid comments

Again, thank you for choosing a Teledyne Brown Engineering Analytical Instruments product. We hope you'll keep us in mind for all your gas and liquid chemical analysis requirements.

Sincerely,

Teledyne Brown Engineering Analytical Instruments

Customer Service Department

FOR ASSISTANCE CONTACT CUSTOMER SERVICE AT

(818) 961-9221 OR (213) 283-7181 / FAX (818) 961-2538

RLC:DVCLTR#11.DOC

MODEL 335

OXYGEN ALARM MONITOR

TELEDYNE ANALYTICAL INSTRUMENTS

16830 CHESTNUT STREET
CITY OF INDUSTRY, CALIF. 91748

TELEPHONE (818) 961-9221
TWX: (910) 584-1887 TDYANYL COID
FAX:(818)961-2538
EASYLINK: 628-31862

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_06556

MODEL 335 OXYGEN ALARM

TABLE OF CONTENTS

	PAGE
INTRODUCTION	1
BASIS OF MEASUREMENT	2
CIRCUIT DESCRIPTION	2
ALARMS	3
ACCURACY	3
CALIBRATION	3
STANDBY BATTERY POWER	4
PRE-OPERATION SERVICE	5
SAFETY CHECKLIST	5
CELL WARRANTY	6
ACCESSORY FLOW-THROUGH ADAPTOR	6

SPECIFICATIONS
SPARE PARTS LIST
DRAWING LIST

SPECIFICATIONS

RANGE:	0-25% OXYGEN
OPERATING TEMPERATURE:	32-125 DEGREES FAHRENHEIT
ACCURACY:	±2% (full scale) at constant temperature or ±5% of reading (worst case) from 32-125°F
ALARM SET POINTS:	20% - CAUTION AND 19.5% - DANGER, unless specified below: _____ CAUTION _____ DANGER WARNING: IF THE UNIT IS BEING USED FOR PERSONNEL SAFETY, SETPOINTS LOWER THAN 19.5% ARE NOT PERMITTED BY OSHA STANDARDS.
SENSITIVITY:	±1%
MICRO-FUEL CELL:	CLASS B-3, unless specified below _____
TYPICAL RESPONSE TIME:	90% IN LESS THAN 11 SECONDS (FOR B-3 SENSOR)

OPERATING INSTRUCTIONS

MODEL 335 OXYGEN ALARM

INTRODUCTION

The Teledyne Analytical Instrument's (TAI) Model 335 Oxygen Alarm accurately measures the oxygen content of the atmosphere surrounding its sensor. The standard measurement range is 0-25% oxygen. The alarm feature of the instrument incorporates two adjustable setpoints to allow alarm warning under either of two independent oxygen level conditions. The standard alarm indication is produced by both an audible annunciator and a visual light, and when an alarm condition exists, a relay is energized to switch a set of relay contacts. Both normally open and normally closed circuits are provided by the Form "C" relay contacts; consult the Interconnection Diagram at the rear of the manual to find the interconnection terminals where the circuits can be accessed.

The instrument is designed as a safety monitor; however, it is the responsibility of the user to establish whether or not the total system or instrument, environment, alarm components, and any other relevant devices, will actually assure safety in his particular circumstances.

The "Safety Checklist" outlined in the "Pre-Operation" section of this manual should be treated as a guide only; it is up to the user to establish practical safety precautions.

It is vital that operator's understand and test the operation of the complete system.

Consult the circuit-related drawings at the rear of the manual to find information about circuit paths (schematic) and connecting points (wiring and interconnection diagrams), as well as physical characteristics and dimensions (outline diagram). These drawings reflect the exact design and construction of your instrument.

WARNING: Befor opening the unit for any reason, turn the power off or use extreme caution. This unit contains 110/220V AC.

BASIS OF MEASUREMENT

The oxygen is measured with TAI's patented Micro-fuel Cell, which consumes oxygen from the atmosphere surrounding the detector and generates a proportional electric voltage. The generated voltage is temperature compensated and amplified to produce the instrument's output signal.

CIRCUIT DESCRIPTION

Follow this description on the Circuit Schematic in the drawings section at the rear of the instruction manual.

The measuring cell produces a current signal which is acted upon by the thermistor, resistor, and span potentiometer network to produce a temperature compensated voltage signal. The voltage signal (about 100 mV ±20%) is applied to the CW terminal of the span pot (P1), and a portion (about half) of the voltage, as determined by the position of the span pot slider, is applied to amplifier A1. Offset zero adjustment is provided at this point by zero potentiometer P2. Capacitors C1 (RFI filter) and C2 (noise filter) improve the signal quality to ensure clean amplification by A1. Adjustment of the span pot can now cause the signal voltage, amplified twenty-fold by A1, to equal 1 volt full scale at the amplifier's output.

The amplified 1 volt signal is fed to the meter, and a full scale meter response with 1 volt applied is accomplished by adjustment of potentiometer P6. Comparator sections A2a and A2b, biased by setpoint potentiometers P5 and P4, respectively, provide direct activation of the alarm relays and LED's; they also enable the oscillator of the audible (beeper) alarm. The alarm relays themselves are ultra-sensitive and require only a few milliamps driving current. Jumpers A through H and J through R allow the alarms to be connected in either LOW or HIGH configuration. The reference voltage for the alarm comparators is taken from the reference comparator circuit, which also monitors the battery and AC line voltage levels.

Comparator sections A2c and A2d compare the battery voltage and a voltage corresponing to the AC line voltage with a 1 volt reference level produced by A1b from D7 and P3. To represent the line voltage, the secondary of the power transformer and a voltage divider are used. If either the battery voltage or the AC line voltage drop below relative preset levels, the appropriate LED will light. Low voltage LED signals must be acknowledged and the problem corrected as soon as possible; eventually, the battery voltage will weaken to the point that the LED's cease to warn of the problem.

The 1 volt reference is applied also to the two alarm setpoint networks consisting of P4/P19 (CAUTION SET) and R20/P5/R21 (DANGER SET), which supply the reference voltages for the two alarm comparators. The positions of the sliders of setpoint potentiometers P4 and P5 determine the reference levels of the two comparators, and consequently provide the setpoints of the two alarms.

ALARMS

When the alarm setpoints are properly adjusted, they provide an operational band which covers all acceptable oxygen concentrations. If the oxygen level at the sensor crosses the adjusted setpoint of one of the alarms, that alarm will cause the switching of relay contacts. Normally open (N.O.) and normally closed (N.C.) circuit connections at the interconnection terminal strip will be reversed. Thus, a circuit that is open (turned off) in a non-alarm condition will be closed (turned on) when its alarm is activated, and vice-versa.

As per OSHA specifications, the standard factory setting of the two alarms provides a "CAUTION" alarm at 20% oxygen (at the sensor) and a "DANGER" alarm at 19.5% oxygen. To cover special cases, a limited amount of adjustment is possible. If your instrument has been specially ordered with other setpoints, then the actual data will be recorded on the specifications page; you will find the terminal strip connecting points for alarms designated in the Interconnection Diagram at the rear of the instruction manual.

ACCURACY

Temperature variation should be avoided for optimum accuracy; nevertheless, the Model 335 is temperature-compensated over the range of 32 to 125 degrees Fahrenheit. When the temperature is constant and within this temperature range, the instrument's accuracy is within $\pm$2% (full scale) or $\pm$5% of reading, whichever is worse.

CALIBRATION

Calibration of a standard instrument is performed by exposing its sensor to ordinary ambient air (not the monitored atmosphere) and adjusting the "CALIBRATE" control until the meter pointer rests at the CAL mark on its scale. This mark represents the normal oxygen concentration of air (20.9%) under standard conditions, so be sure that the sensor is exposed to fresh air when using the calibration mark.

If it is not feasible to use ordinary air as the calibration gas, then clean, compressed instrument air can be used. It will probably be necessary to seal the sensor in the piped-in calibration gas to isolate it from the surrounding atmosphere. A flow-through adaptor can be purchased from TAI as an accessory for those applications. Although a special calibration gas can be used, the calibration results will be meaningless unless the oxygen concentration of the calibration gas is known, and the analyzer is adjusted to indicate that concentration. To be sure that there is no error caused by the calibration gas, always use a certified composition with an oxygen concentration that equals between 80% and 90% of the full scale meter reading of the analyzer.

Calibration in the same atmosphere that is being monitored will completely invalidate all measurements and alarms.

STANDBY BATTERY POWER

The Model 335 is powered completely from the AC power line to which it is connected, unless a power failure occurs. Power outages will not interfere with a properly-working Model 335 oxygen alarm if it is installed and used correctly. This is because each (standard) instrument is equipped with a standby power source using rechargeable nicad (nickel-cadmium) batteries. As a result, if the AC power is temporarily impaired ("brown-out") or interrupted, the stand-by power supply takes over and keeps the analyzer in operation.

To periodically test the condition of the battery pack, press the "BATTERY TEST" pushbutton on the instrument's control panel, and note the battery condition in the area so designated on the meter scale. Release the pushbutton to return to the normal sampling mode. The battery test provides only an indication of the battery state under the test conditions; it is possible that a battery might test well but perform for only a short time under actual operational conditions (a characteristic of the battery, not the analyzer), so it is very important that power outages be corrected without delay. Furthermore, we recommend that the instrument be tested periodically by operating it for several hours without AC power (that is, under battery power).

The standard Model 335 is designed to operate on standby battery power for at least 6 hours if conditions are favorable (that is, if conditions are not extreme, and if the batteries are in good condition and well charged). Under actual conditions, however, these factors will always tend to evolve toward the worst case if left unattended. Therefore, the user must always ensure that battery condition, charge, and other related factors are monitored with sufficient frequency to prevent problems. Most importantly, DO NOT DEPEND UPON THE LONGEVITY OF BATTERY BACKUP, but correct problems as soon as possible.

PRE-OPERATION SERVICE

Before placing the Model 335 in operation, you must install the Micro-fuel cell and connect the battery.

Install the cell in the probe assembly:

1. Remove the probe from its holder inside the instrument case, and remove the cell from its sealed shipping package.

2. Unscrew the cap from the top of the probe assembly.

3. Remove the shorting clip from the cell. REMOVE THE MEMBRANE END OF THE SHORTING CLIP FIRST so that it does not puncture the soft membrane.

4. Place the cell in the probe with the terminal end facing down toward the probe contacts and the soft membrane surface facing the outside.

5. Replace the probe cap, making sure that it is all the way down and seated on the probe body, then replace the probe assembly into its holder.

Connect the battery as follows:

1. Remove the tape from the red wire and the white green wire.

2. Connect the red wire to TS2-5; connect the white green wire to TS2-6.

SAFETY CHECKLIST

The following checklist is offered only as a guide to assist the user in verifying a number of important factors; it is by no means a complete list of safety-related items. The procedures and precautions relating to the use of the instrument in the user's process must be developed by the user. It is vital that the operator understand and test the operation of the total system.

Verify that:

1. Instrument power is active and adequate.

2. Instrument functions are operational.

3. Alarm indicators are effective and produce intended results.

4. Unauthorized personnel are prevented from tampering with the instrument or auxiliary equipment.

5. Routine test and calibration procedures are instituted and followed.

6. Any and all sampling and/or location problems are identified and handled.

7. Any and all necessary warning labels, notices, and information are provided.

8. Operators understand the operations and functions of the analyzer and system.

9. Any environmental or other influences that could affect the operation or accuracy of the instrument are identified and handled.

CELL WARRANTY

The class B-3 cell used in the Model 335 is warranted for twelve (12) months of service. Under normal operating conditions the class B-3 cell should last twelve months in air. For special applications, optional cells are available.

Customers having warranty claims must return the cell in question to the factory for evaluation. If it is determined that failure is due to faulty workmanship or materials, the cell will be replaced free of charge. CAUTION: Evidence of mishandling will render the cell warranty null and void. If a cell was working satisfactorily, but fails short of its warranty period, the customer will receive credit, on a pro-rated basis, toward the purchase of a new cell.

ACCESSORY FLOW-THROUGH ADAPTOR

A flow-through adaptor is available for the Series 335 Oxygen Analyzer for those applications which require piped-in gases. The adaptor consists of a sealed chamber into which the instrument's probe can be inserted, with two radially-oriented hose connectors to which supply and vent lines for the calibration gas can be connected. The design provides gas flow over the sensing surface of the cell without contamination by the surrounding monitored atmosphere.

RECOMMENDED SPARE PARTS LIST

FOR STANDARD MODEL 335 INSTRUMENTS

QTY.	PART NO.	DESCRIPTION
1	C-6689	MICRO-FUEL CELL, CLASS B-3 (IF NON-STD, SEE SPEC. PAGE)
4	B-76	BATTERY
1	M-69	METER
1	F-8	FUSE, 1/2 AMP SLO-BLO
1	L-52	INDICATOR LIGHT (RED)
1	A-20	ALARM, SONALERT
1	P-102	SPAN POTENTIOMETER
1	R-914	RELAY
2	S-521	SPRING, RELAY HOLD-DOWN

A MINIMUM CHARGE OF $ 20.00 APPLIES TO SPARE PARTS ORDERS.

IMPORTANT: Orders for replacement parts must include the part number (if available) and the model and serial numbers of the instrument for which the parts are intended.

SEND ORDERS TO:

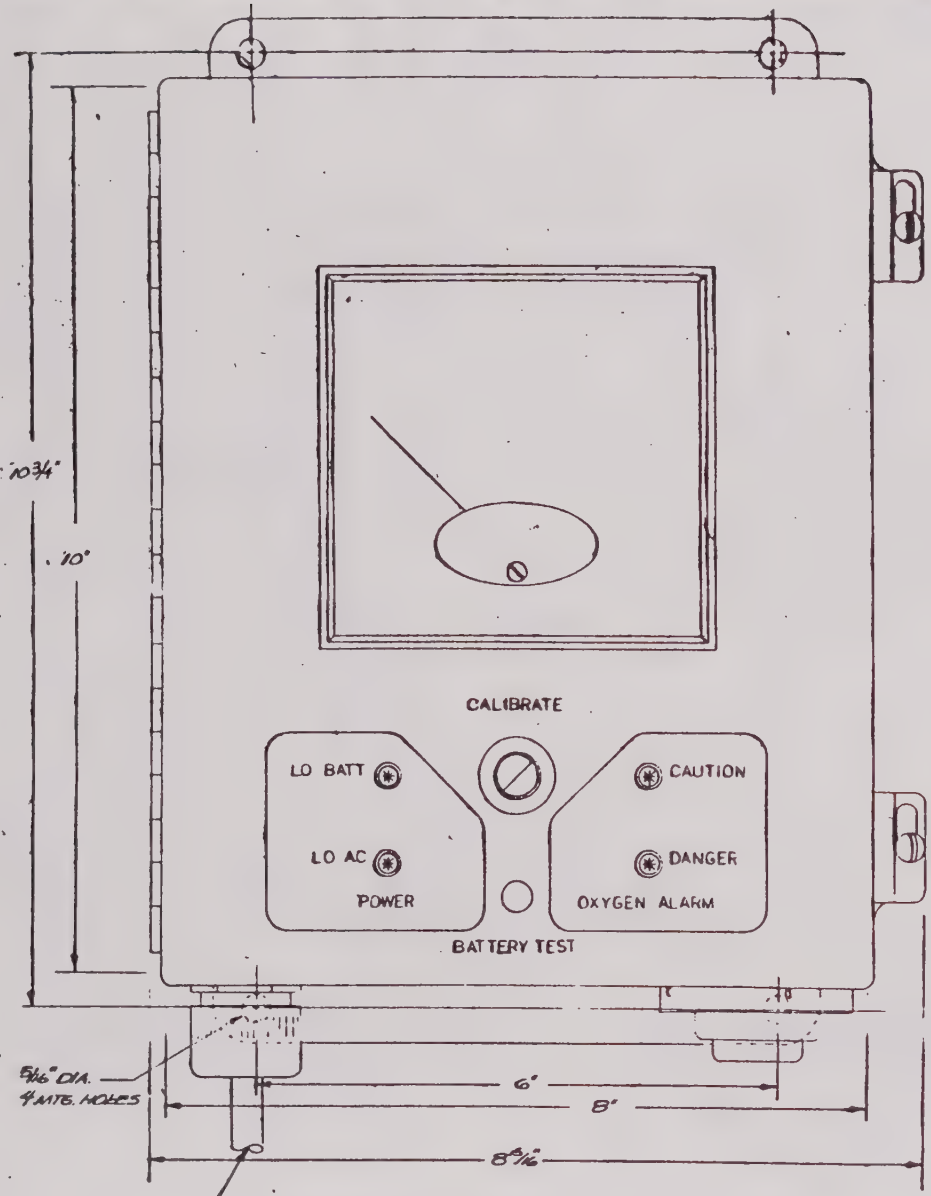
TELEDYNE ANALYTICAL INSTRUMENTS
16830 CHESTNUT STREET
CITY OF INDUSTRY, CALIF., 91748
TELEPHONE (818) 961-9221
TWX: (910) 584-1887 TDYANYL COID
OR YOUR LOCAL REPRESENTATIVE

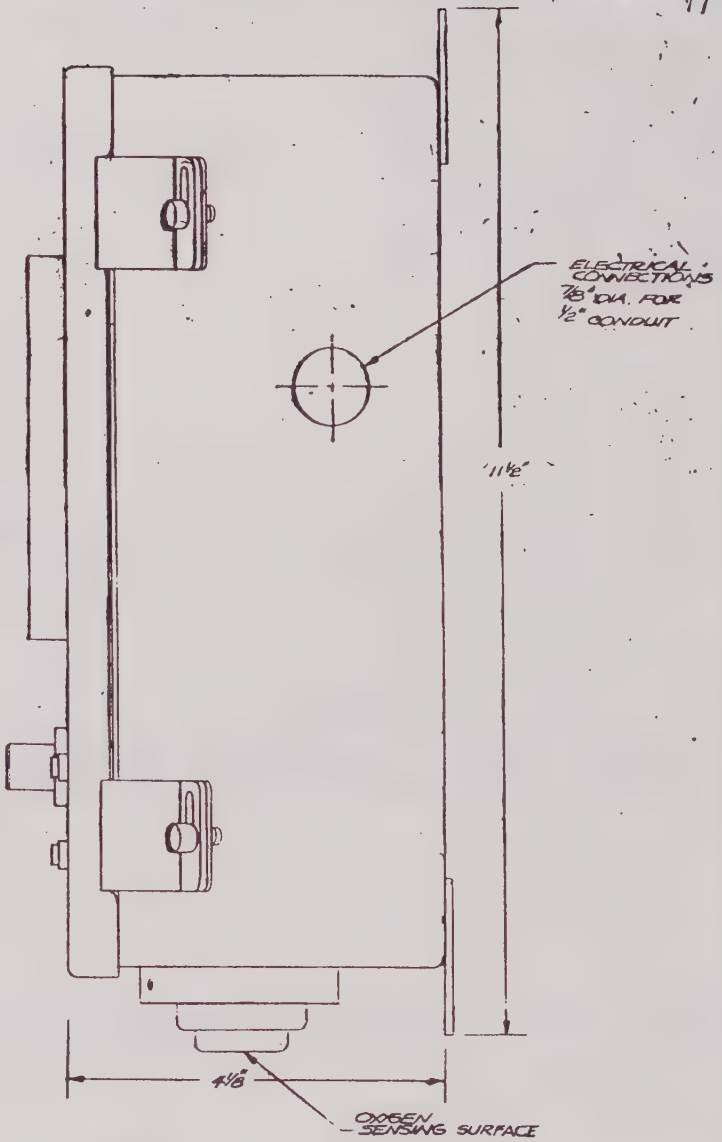
DRAWING LIST

MODEL 335

C-24634	OUTLINE DIAGRAM
A-24690	INTERCONNECTION DIAGRAM
B-24663	SCHEMATIC

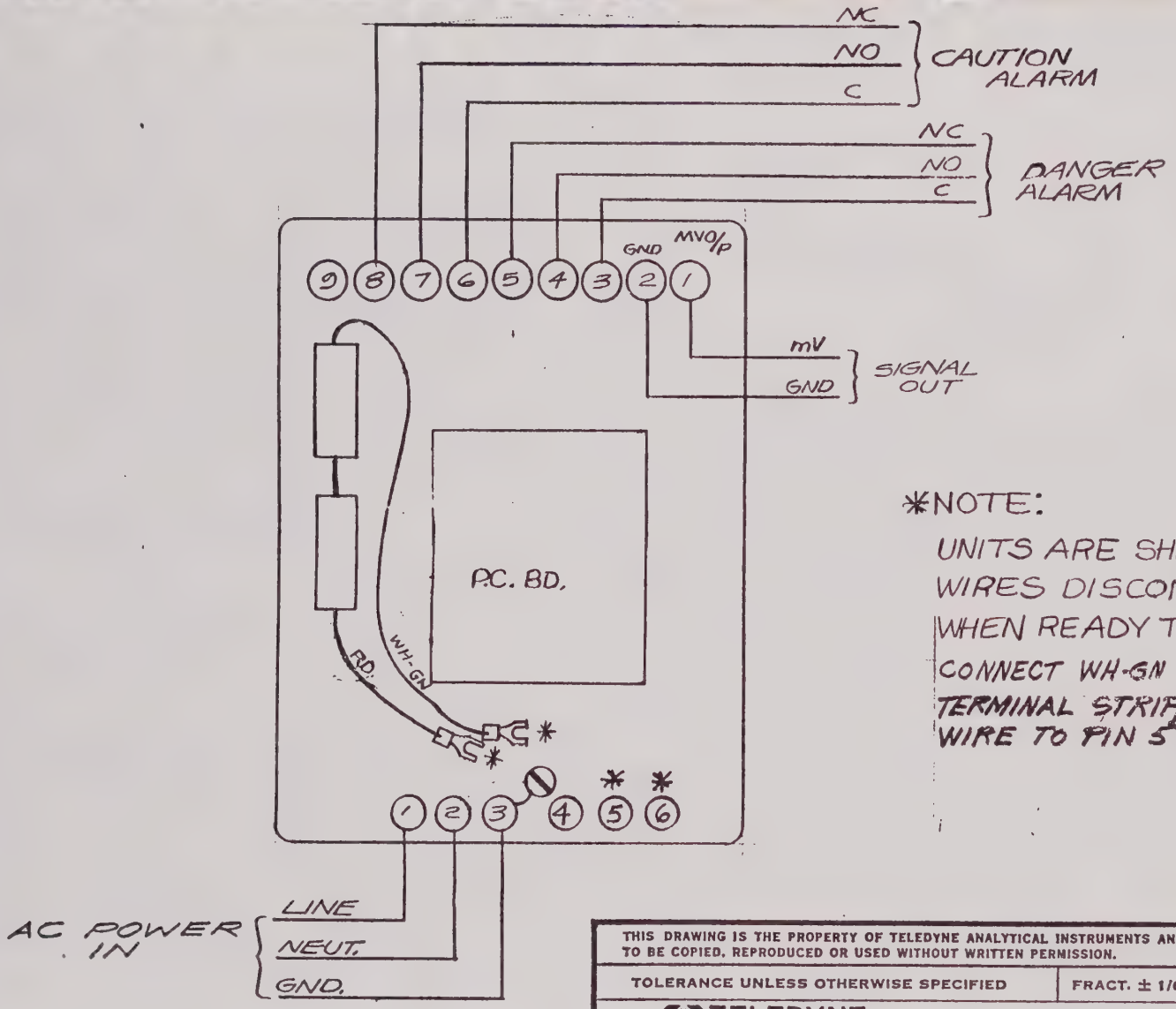
1. 5-19-80
2. 9-25-80





TELEDYNE ANALYTICAL INSTRUMENTS SAN GABRIEL, CALIFORNIA		SCALE FULL	DATE 9/9/80
MDL 325-1 OXYGEN MONITOR OUTLINE DIAGRAM	SC 10578	FCO	C-24634

ISSUE NO.	APP.
1) 9-29-80	RHA
2) 11-24-80	1/C
3) 5-11-81	1/C
ADDED CONNECTION NOTE: REVD WIRES 4) 9-25-86	~~CHL~~



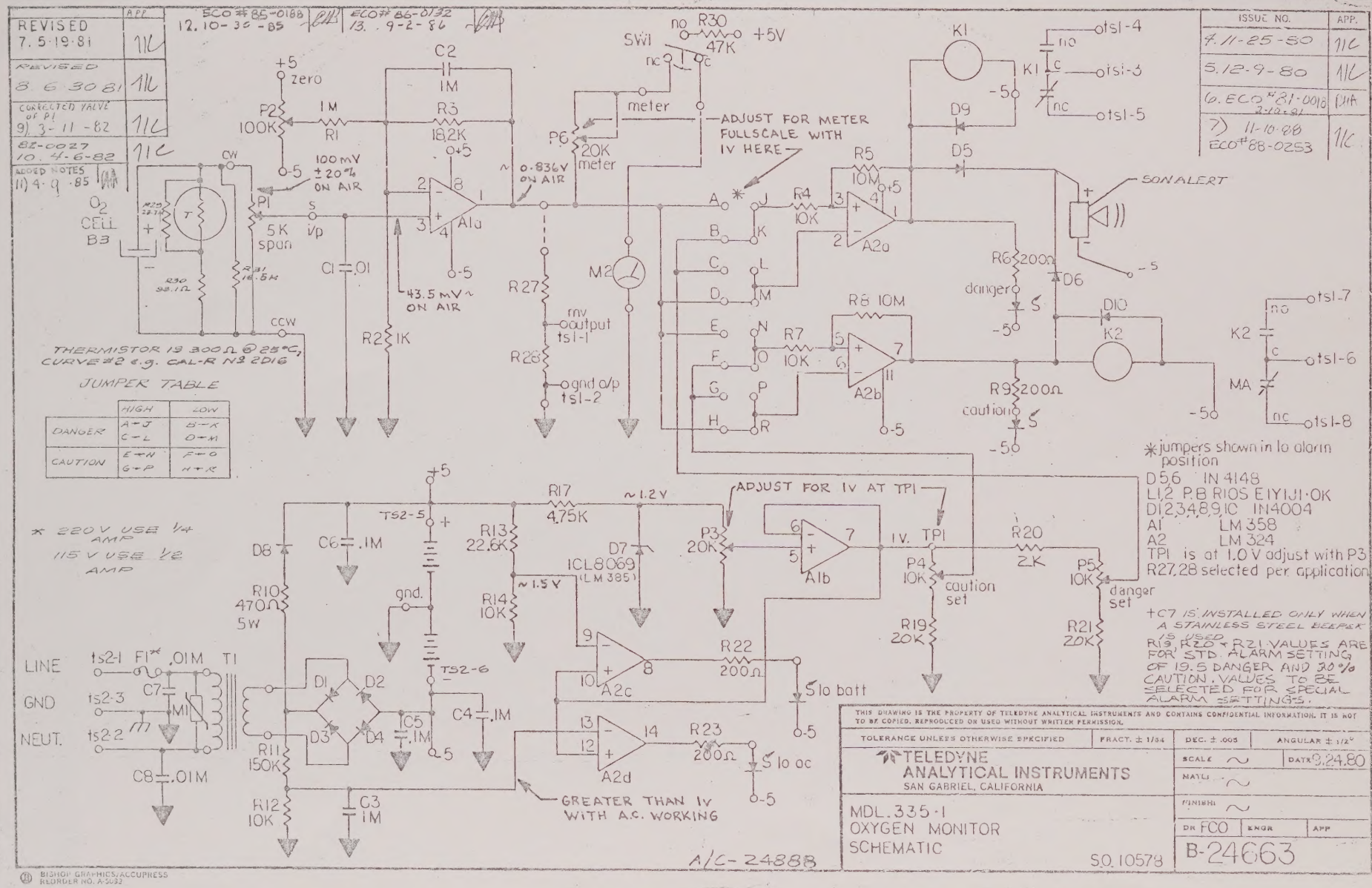
*NOTE:

UNITS ARE SHIPPED WITH BATTERY WIRES DISCONNECTED.
WHEN READY TO START UP UNIT, CONNECT WH-GN WIRE TO PIN 6 OF TERMINAL STRIP THEN CONNECT RED WIRE TO PIN 5 OF TERMINAL STRIP.

THIS DRAWING IS THE PROPERTY OF TELEDYNE ANALYTICAL INSTRUMENTS AND CONTAINS CONFIDENTIAL INFORMATION. IT IS NOT TO BE COPIED, REPRODUCED OR USED WITHOUT WRITTEN PERMISSION.

TOLERANCE UNLESS OTHERWISE SPECIFIED	FRACT. ± 1/64	DEC. ± .005	ANGULAR ± 1/2°
TELEDYNE ANALYTICAL INSTRUMENTS SAN GABRIEL, CALIFORNIA		SCALE NONE	DATE 9,25,80
		MATL: ~	
MDL. 335-1 OXYGEN ANALYZER INTERCONNECTION DIAGRAM S.O. 10578		FINISH: ~	
		DR FCO / ENGR / APP	
		A-24690	

BISHOP GRAPHICS / ACCUPRESS


REVISED 7. 5-19-81
REVISED 8 6 30 81
CORRECTED VALVE OF P1 9) 3-11-82
81-0027 10. 4-6-82
ADDED NOTES 11) 4-9-85
ECO # 85-0188 12. 10-30-85
ECO # 86-0132 13. 9-2-86
ISSUE NO. 7. 11-25-80
5. 12-9-80
6. ECO # 81-0018 3-12-81
7) 11-10-88 ECO # 88-0253
O2 CELL B3
THERMISTOR 19 300Ω @ 25°C, CURVE #2 e.g. CAL-R N2 2016
JUMPER TABLE
HIGH
LOW
DANGER
CAUTION
100 mV ± 20% ON AIR
0.836V ON AIR
43.5 mV ON AIR
ADJUST FOR METER FULLSCALE WITH 1V HERE
ADJUST FOR 1V AT TP1
GREATER THAN 1V WITH A.C. WORKING
SONALERT
*jumpers shown in lo alarm position
D5,6 IN 4148
L1,2 P.B RIOS E1Y1J1-OK
D1,2,3,4,8,9,10 IN4004
A1 LM 358
A2 LM 324
TP1 is at 1.0 V adjust with P3
R27,28 selected per application
* 220 V USE 1/4 AMP
115 V USE 1/2 AMP
+C7 IS INSTALLED ONLY WHEN A STAINLESS STEEL BEEPER IS USED
R19, R20 & R21 VALUES ARE FOR STD. ALARM SETTING OF 19.5 DANGER AND 20% CAUTION. VALUES TO BE SELECTED FOR SPECIAL ALARM SETTINGS.
THIS DRAWING IS THE PROPERTY OF TELEDYNE ANALYTICAL INSTRUMENTS AND CONTAINS CONFIDENTIAL INFORMATION. IT IS NOT TO BE COPIED, REPRODUCED OR USED WITHOUT WRITTEN PERMISSION.
TOLERANCE UNLESS OTHERWISE SPECIFIED
FRACT. ± 1/64
DEC. ± .005
ANGULAR ± 1/2°
TELEDYNE ANALYTICAL INSTRUMENTS
SAN GABRIEL, CALIFORNIA
SCALE
DATE 9.24.80
MATL
FINISH
DR FCO
ENGR
APP
MDL. 335-1
OXYGEN MONITOR
SCHEMATIC
SO. 10578
B-24663
A/C-24888
BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-5032

TELEDYNE BROWN ENGINEERING
Analytical Instruments

Sensors • Analyzers • Systems

Scientific Solutions

16830 CHESTNUT STREET, CITY OF INDUSTRY, CA 91749-1580 U.S.A. • (818) 961-9221 • (213) 283-7181 • TWX (910) 584-1887 • TDYANYL COID • FAX (818) 961-2538